Date of Meeting: June 29, 2021

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BOARD OF SUPERVISORS
2021 TRANSPORTATION SUMMIT
INFORMATION ITEM

SUBJECT: **Transportation Project Development Process**

ELECTION DISTRICTS: Countywide

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PURPOSE: To provide an overview of the process to develop a transportation project from project initiation, planning, design, right-of-way acquisition, utility relocation, procurement, construction, and project close out.

BACKGROUND:

Transportation Capital Program Milestones: Transportation capital improvements have traditionally been funded, developed, and built by the Commonwealth of Virginia through its Commonwealth Transportation Board and the Virginia Department of Transportation (VDOT). In addition to VDOT, the private sector has also completed many miles of the County's roadway network. Starting in 2009 and continuing until 2015, several significant developments took place that led to the current situation where the Loudoun County (County) Fiscal Year (FY) 2021 – FY 2026 Capital Improvement Program (CIP) is investing approximately $1.2 billion over six years into transportation projects. Just ten years ago, the FY 2011 – FY 2016 CIP invested approximately $45 million over six years for non-transit transportation projects. A listing of milestones is included below:

- 1998-2001 – The County performed its first Locally Administered Project (LAP). This was a Revenue Share project that reconstructed and paved a 0.3-mile-long segment of Braddock Road at the Fairfax County line. It would be about five years before the County administers another "LAP."

- 2009-2010 – VDOT implements its "Blueprint for the Future" in response a $6.1 billion shortfall in transportation funds. Measures to address this shortfall include a reduction in its construction program by 72% and a reduction in force from 10,500 employees to a maximum of 7,500 statewide. This cap has been written into the Code of Virginia.

- 2012 – The Department of Transportation & Capital Infrastructure (DTCI) is formed by combining the former Office of Transportation Services and the capital project divisions of the Department of Construction and Waste Management.

- 2013 – The Virginia General Assembly approved, and the Governor signed House Bill 2313, a comprehensive transportation funding bill for the Northern Virginia Transportation Authority (NVTA) Fund. Dedicated revenues begin to flow from the Commonwealth of Virginia to the NVTA at the beginning of FY14. Funds are separated into "30% Funds," which are distributed to the localities for use at the discretion of the local governing bodies, and "70% Funds," which is application-based funding with metrics for congestion mitigation, safety, mobility among other criteria.

- 2014 – The Loudoun County Board of Supervisors (Board) dedicates two cents of its tax rate to investment in transportation.

- 2015 – VDOT establishes "Smart Scale," a statewide program that distributes funding based on a transparent and objective evaluation of projects that will determine how effectively to help the state achieve its transportation goals. Projects must address improvements to a Corridor of Statewide Significance, Regional Network, or Urban Development Area (UDA) that meet a need identified in the statewide multimodal long-range transportation plan, VTrans.

Basis for Transportation Project Development: The Countywide Transportation Plan (CTP) establishes the basic transportation needs of the County and guides the long-range planning of the County's transportation network. The current plan identifies the transportation roadway network necessary for land development anticipated by the year 2040. Transportation project development uses the CTP to establish the design criteria for projects including functional classification, number of lanes, typical cross-sections, design speed, and pedestrian and bicycle facilities.

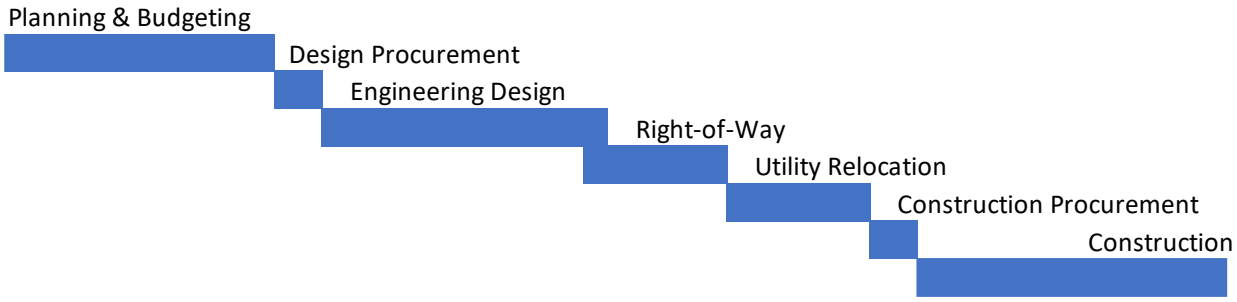
Although the CTP provides the overall framework for transportation projects, the County's CIP outlines the financial plan to actively develop projects within the current and future six years. Since the transportation needs presented in the CTP exceed the County's resources during any given six-year period, the inclusion of transportation projects in the CIP are determined by the Board based on need, available funding, and other County capital priorities. The need for a project can be based on congestion mitigation, improving safety, providing pedestrian and bicycle facilities, enhancing economic development, or other factors deemed by the Board.

At the Board's direction, DTCI staff conduct various studies to help quantify roadway congestion, safety concerns, and pedestrian and bicycle facility demand. This information assists the Board in determining what transportation projects to include in the CIP and the level of need. Typically, new projects added to the CIP begin with funding in the later years of the six-year plan with funding moving toward the current year in successive CIPs. Occasionally, the Board identifies projects requiring more immediate action that cannot wait several years to work themselves through the CIP. These projects can be funded using contingency accounts if relatively small, prior

fiscal year fund balance, or by amending the CIP.

Transportation Development Process: Transportation projects typically entail seven primary steps as outlined in the Figure 1 below (this process assumes a traditional design-bid-build method).

Figure 1 -- Transportation Project Development Process



Planning and Budgeting: The planning and budgeting phase includes development of the project's scope, schedule, and funding plan. Although the CTP provides guidance for a project's general design criteria, it is during this phase that the specific characteristics of the project corridor are reviewed to determine project specific constraints and challenges that will need to be addressed during the engineering design phase. Elements such as wetlands, floodplains, waterways, steep slopes, existing structures, historic features, high-valued land, utility density and other items of interest are identified. After these elements are identified, the need for special design features such as culverts, bridges, retaining walls, extensive earthwork, or non-typical roadway cross-sections can be better understood. Planning level schedules and cost estimates are then developed using this information. Ultimately this information is used to help program a project into the CIP.

Different methods exist for developing planning level cost estimates given some basic understanding of the project. In the past, simple parametric values were used to estimate a project's cost such as a certain dollar amount per lane mile of road. VDOT utilizes a tool known as the Preliminary Cost Estimating System (PCES) that uses historical construction cost information to generate estimates given some basic design parameters such as roadway classification, number of lanes, estimated lengths of roadway, sidewalks, and shared use trails, anticipated turn lanes, anticipated traffic signals, anticipated special structures, estimated land requiring acquisition, and estimated utility relocation. PCES becomes a more powerful tool when the design elements of the project become more defined. Since planning level cost estimates are performed with little to no design completed, they generally carry a high level of contingency to deal with unknowns. VDOT has also developed a project schedule template that can be used to estimate the duration of each project phase.

Given the high variability of planning level cost estimates, DTCI is increasingly engaging design consultants to develop 10% to 15% designs to estimate project costs more accurately. In particular, this method is being used for competitive funding such as Smart Scale where the thoroughness of

project cost estimates impacts how well a project scores. Due to the increasing need for more thorough and accurate planning level cost estimates, a Scoping and Preliminary Engineering fund was created as part of the Fiscal Year (FY) 2022 CIP for developing 10% to 15% designs on projects in the planning phase.

Once the preliminary scope, cost estimate, and schedule are developed, DTCI works with the Department of Finance and Budget (DFB) on a project funding plan. Since the different phases of a transportation project occurs over multiple years, DTCI works specifically with DFB to program the funding into the appropriate fiscal years based on the estimated project schedule. It is through this process where projects are identified for potential outside funding using various VDOT programs, Northern Virginia Transportation Authority (NVTA) funding, or grant programs. DTCI staff develops funding applications during this process once projects are targeted for outside funding sources.

The planning and budgeting step typically takes six to nine months to complete.

Design Procurement: When project funding becomes available to begin the engineering design phase, DTCI works with DFB to procure design consultants. The consultant selection process includes professional services scoping, identification of consultant qualifications, and the establishment of a consultant selection committee, all leading to a solicitation process whereby a professional services contract is ultimately awarded. For design contracts in excess of $2.5 million, a Request for Proposals (RFP) must be developed and advertised prior to design initiation. For those design contracts less than $2.5 million, task order contracts may be used to complete the services.

The Virginia Public Procurement Act (VPPA) §2.2-4301 classifies engineering services as "professional services" and requires they are procured through competitive negotiation, otherwise known as a Request for Proposal (RFP) process. The RFP is drafted indicating in general terms that which is sought to be procured, specifying the factors which will be used in evaluating the proposal and containing or incorporating by reference the other applicable contractual terms and conditions, (including those which are not negotiable), including any unique capabilities or qualifications which will be required of the engineering firm. A RFP for professional services must be based on qualifications or professional competence.

Per the VPPA §2.2-4302.2, the RFP cannot request that offerors furnish estimates of man-hours or cost for services. The RFP must be publicly posted, advertised in a paper of record (the County is currently contracted with the Loudoun Now) for at least 10 days, and includes opportunities for prospective offerors to ask questions at a Pre-Proposal Conference held by the County or by contacting the Contracting Officer in DFB during the proposal period. Typically, most engineering RFPs are published for approximately 30 – 40 days, depending on the size and complexity. A proposal opening is held on the date and time the proposals are due; however, only the names of the responding firms are read aloud. Proposals are reviewed initially by a Contracting Officer in DFB for completeness and to ensure that offerors are currently registered with the State Corporation Commission (SCC) in accordance with §2.2-4311.2.

DFB manages and facilitates the proposal evaluation process. Proposals are then distributed to a Proposal Analysis Group (PAG) for review. The PAG is composed of a minimum of three County staff, excluding DFB staff, in cooperation with the appropriate agency(s) or department(s). PAG members may include, at times, non-staff individuals when additional expertise is needed. Once each member of the PAG has had an opportunity to independently review the proposals received, a PAG meeting is convened to collectively discuss and evaluate the proposals based upon the evaluation criteria included in the RFP. The PAG will then score and rank the proposals, determining which firms to select for the discussion or "shortlist" stage. Shortlisted firms are then scheduled for interviews with the PAG to further discuss their qualifications and understanding of the project. Once the interviews are completed, the PAG reconvenes to review the additional information received during the interviews and rank the shortlisted firms to determine the most qualified firm.

Negotiations then begin with the top ranked firm. If the terms of a contract can be negotiated at a price considered fair and reasonable, the award shall be made to that top ranked firm. However, if negotiations are not successful with the top ranked firm, then negotiations must be formally terminated and then negotiations with the second ranked firm will begin, and so on until such a contract can be negotiated at a fair and reasonable price. If negotiations are not successful with the second ranked firm, negotiations may not be restarted with the original top ranked firm.

The total RFP process from drafting to award can take approximately six months to eight months to complete, depending on the size and complexity of the project. However, some transportation projects can be completed in less time if they are smaller in size and cost. Staff has established term "task order" contracts for as needed engineering services in accordance with §2.2-4303.1 of the VPPA. Task order contracts are established by issuing an RFP and multiple contracts are awarded. There are limits established by the VPPA for both length and value of these contracts. These task order contracts can be up to a year in length with up to four (4) additional one year renewal options. Individual projects cannot exceed $2.5 million and the annual limit on each contract cannot exceed $8 million. In order to not expend the annual limit too early within the contract year, staff typically uses task order contracts for design projects expected to be less than $2.0 million. Using task order design contracts significantly reduces the amount of time it takes to secure a contract for engineering services. If these task order contracts were not in place, staff would have to issue an RFP for every design contract expected to exceed $80,000, as required by the VPPA. The timeframe to award a contract under the task order contract can be accomplished in one to three months, depending on the complexity of the project.

For projects being funded using general obligation bonds, engineering services cannot be procured until the bond referendum authorizing the debt is approved. Depending on the type of design procurement required for a project, the design procurement step can vary from one to eight months.

Engineering Design: The purpose of the engineering design phase is to identify existing conditions along the project corridor, perform the necessary engineering analyses to determine the facilities needed to meet the project scope, and to develop drawings, notes, and specifications that can be used by a contractor to construct the project. Since design elements tend to build upon other design

elements, the design process typically occurs using an iterative approach. Transportation design documents are typically reviewed by DTCI, VDOT, and the Loudoun County Department of Building and Development (DBD) at the 30%, 60%, 90%, and 100% completion stages. As the design moves from one milestone to another, the level of detail increases and the design elements begin coordination with other development issues such as permitting, right-of-way acquisition, utility relocation, and constructability.

The 30% design phase is generally considered preliminary engineering and includes the establishment of the horizontal alignment, vertical profile and a basic strategy for conveying and treating stormwater. It is during this phase that the project area is surveyed, environmental investigations are performed, and utilities are designated in the field. Prior to performing the detailed analyses required for conveying and managing stormwater, a review of the 30% design by VDOT and DBD is desired to ensure it meets fundamental roadway geometric requirements. It is much easier to adjust the horizontal and vertical layout of the facility at 30% than at later stages of design that require a greater effort of re-work to adjust detailed design features.

Since the 30% design shows the general alignment of the facility, but still has some flexibility to change, this is the best point for conducting public involvement. DTCI in coordination with Public Affairs conducts Public Information Meetings (PIMs) to highlight the proposed alignment(s) and major design elements of a projects to the public and allows the public to provide feedback. Based on feedback provided at the PIM, the 30% design can be modified if deemed appropriate to address public feedback or explanations can be provided to the public explaining why certain design elements exist. After public involvement occurs and public feedback is addressed, DTCI typically will present the preliminary design to the Board and seek endorsement of the alignment and major design elements. This endorsement is a key milestone in the project development and provides the direction staff needs to finalize the design and initiate the acquisition of land needed for the project.

After regulatory review of the 30% design, public involvement, and Board endorsement of the design, 60% design plans are developed. During 60% plan development, stormwater conveyance and stormwater management facilities are designed. It is also during this phase that the horizontal and vertical alignments are refined. The 60% plans are submitted to VDOT and DBD seeking comments on the stormwater conveyance and stormwater management designs before proceeding to final design.

It is at this point in the design where potential utility conflicts are identified, and a Utility Field Inspection (UFI) meeting is conducted with potentially impacted utility providers. After the UFI meeting, utility providers are responsible for confirming utility conflicts, preparing relocation designs to address the conflicts, and providing a cost estimate for relocating the utilities. If the utility relocation requires the creation or adjustment of an easement, the utility provider also submits a request for the easement. The utility relocation process is outlined more completely in a later section of this item.

After receiving easement requests from utilities as part of the utility relocation process, the design consultant can identify the land that needs to be acquired for right-of-way (ROW) and easements to facilitate construction of the project. The acquisition requirements are documented on the design

plans as they go through final design (90% design). It is during this process that plat preparation is initiated, and land acquisition planning starts. Also, during this period, applications for environmental permits are generally submitted to the appropriate regulatory agencies. The 90% plans are submitted to VDOT and DBD for review prior to developing the bid documents (100% plans).

The 100% plans display all the details required for constructing the facility and are used for bidding the project. In addition to design drawings, the 100% plans include specifications and special provisions required by the contractor to construct the facility as intended. Once the 100% plans are reviewed by VDOT and DBD and found to meet all applicable standards, the documents are approved and can be used for construction. Prior to bidding the project for construction, the necessary ROW and easements need to be acquired and utilities in conflict need to be relocated.

The engineering design step can take from 12 to 30 months to complete depending on the size and complexity of the project.

Right-of-Way Acquisition: The ROW and utility coordination phase involves the acquisition of land for the project; relocation assistance for displaced individuals, businesses, and personal property; and the design and relocation of public utilities in conflict with the project. When state or federal funds are used on a project this phase may not be initiated until the environmental and project plans have been formally approved by VDOT and official authorization to proceed (ROW Authorization) has been granted. If the County begins property negotiations prior to ROW Authorization, project funding could be jeopardized. DTCI has four land acquisition managers (LAM) that work with property owners to acquire land rights needed for transportation projects. In addition, three on-call Real Property Acquisition Consultants are used as needed. The land acquisition team works very closely with the County Attorney's office, which has designated an Attorney and paralegal to assist DTCI.

Right-of-Way Acquisition Legal Requirements – The land acquisition process is strictly governed by State and Federal regulations. VDOT requires the County to adhere to the Federal Uniform Relocation Act ("Uniform Act") established by Congress in 1970. The Uniform Act was enacted to ensure all people are treated uniformly and fairly when Federal, State, or local governments are acquiring land rights needed for public projects. Prior to establishment of this act, people or their personal property were often relocated without notice or payment.

Strict compliance with the Uniform Act is monitored by VDOT personnel. Any deviation from the requirements will prevent the County from receiving funding reimbursement for any phase of the project. For state and federally funded projects; prior to project advertisement, a "ROW Certification Letter" must be completed by the local jurisdiction and submitted to obtain VDOT ROW Authorization.

The County's land acquisition program must also adhere to related Virginia State laws including Title 25.1 Eminent Domain and Title 33.2 Highways and Other Surface Transportation Systems. In addition, we must comply with the VDOT Right-of-Way Manual and Chapter 16 (Right-of-Way) of the Locally Administered Project Manual (LAP Manual).

Right-of-Way Acquisition Process – Once DTCI has received authorization to proceed with ROW acquisition the following steps are taken. If a project is funded with only local funds, then acquisition can proceed at the point when the land rights on the plat are finalized.

Title – A title report must be ordered on each property to ascertain the property owner and any property encumbrances such as a mortgage or conservation easements. If the property has a mortgage, the bank is often required to sign the deed. If fee simple ROW is acquired, this reduces the amount of land the bank has as collateral; therefore, most mortgages require the bank to be a party to the deed. In the case of conservation easements, depending on how the easement language is written, the County will sometimes need to find replacement conservation land.

Appraisal - State Code Section 33.2-1011 requires a property owner's permission to enter their property for inspections related to transportation projects, including appraisals. The property owner must be given two weeks-notice for the appraisal inspection. If the property owner does not authorize access, then the appraiser must give an additional two weeks-notice and advise the property owner they will be coming on the property. On July 1, 2021, this code section will change to require a one-time four week notice to the property owner. The County has four contracted on-call licensed appraisers that are on VDOT's approved appraiser list. The appraisal requirements are unique and very specific to eminent domain appraisals. The purpose is to determine the land rights compensation due to the property owner, value for cost to cure items such as landscaping or fencing removal, and to determine whether the property has been significantly damaged by the take. The level of detail required in the analysis usually has a delivery timeframe of four to six weeks. If there is State or Federal funding on a project, a Review Appraisal is required by a separate consultant called a "Review Appraiser." The review appraisal process generally takes an additional two to four weeks. Upon receipt of the final appraisal, the LAM reviews the appraisal for accuracy.

Offer Letter - Once the appraisal is deemed approved, a compensation offer letter is drafted by the LAM and reviewed by the Director of DTCI and the County Attorney's Office. The Director's review insures the property owners are paid equitably but not overpaid. The County Attorney ensures all legal requirements for the specific property situation are met.

Delivery of Offer - The LAM delivers the offer package to the property owner and arranges a time to discuss the offer in detail. VDOT recommends giving the property owners a minimum of 30 days to consider the offer. If the property owner still has questions, it may take 60-90 days or longer until they fully understand and are willing to sign the required deed and agreement.

Negotiation Period – Prior to seeking condemnation, the County must demonstrate they have negotiated in good faith with impacted property owners. If a property owner has concerns or disagrees with the offer, they may hire their own appraiser, obtain cost estimates, or provide additional information that was not considered in the original offer. If the property owner is proceeding in good faith to reach an agreement, the negotiations continue to the point where an agreement is reached. If the negotiations are not successfully progressing or the property owner refuses the County's offer, an impasse is reached, and negotiations cease.

Impasse – An impasse is reached for a variety of reasons. A property owner may be contacted repeatedly by various means, like mail, email, or phone, yet are unresponsive. An impasse can

occur when staff has negotiated with the property owner in good faith and the offer and owner expectations remain too far apart. Another example is when a Homeowner's Association documents are unclear, or the HOA cannot get the needed votes. Once an impasse has been reached, staff will request authorization from the Board to move forward with condemnation.

Condemnation – The condemnation process begins by seeking authorization from the Board in a closed session meeting. If the Board favors moving forward with condemnation, then a public hearing is required to advise property owners and the public the County will be proceeding with condemnation. After the public hearing occurs, the County Attorney's Office is required to give the property owner 30 days-notice of their intent to file a Certificate of Take. Following the 30-day notice, the County Attorney's office deposits the compensation funds into the Court and obtains a Certificate of Take. The project may proceed to construction once the Certificate of Take has been obtained and all other property rights are acquired.

ROW Timeframe – Given a willing and cooperative property owner, in the optimal scenario the County can complete ROW acquisition within a ix-month time frame given the steps required in the process. If the County is in productive negotiations with a property owner this process can extend six to twelve months. If the County needs to proceed to condemnation on one or more properties, the entire process can extend to 12 to 18 months. As the number of properties or complexity increases, the acquisition period will increase as well. For example, the Farmwell Road project has 47 properties, with an anticipated acquisition phase of 12-18 months.

Utility Relocation – Early in the preliminary design phase of a project, the design consultant will conduct a survey of the project which includes designating all overhead and underground utilities within the limits of the project. The utility survey is then overlaid onto the project plans. The design consultant along with input for DTCI's Utility Engineer will put together a test pit plan which is utilized to acquire data in the field about the utilities that are potentially in conflict. This data will provide an accurate location and depth of each utility. Knowing the exact location, type and size of utilities located within the limits of the project allows the project team the opportunity to design the project around the utility if beneficial to the project.

Once all test pit information has been acquired and the project plans reach the 60% design milestone, a UFI meeting is scheduled with representatives of all the utility companies affected by the project. This meeting is typically the first formal introduction of the project to the utility companies. The purpose of the UFI meeting is to inform the utility companies of the upcoming project. All utility companies are provided with the current 60% plans, project schedule and a VDOT UT-9 form which serves two purposes: details all conflicts for each utility company as well as providing an initial cost responsibility amount. During the meeting all conflicts, easement needs, and other pertinent information are discussed with each utility company. The UFI meeting also sets a schedule moving forward for all utility related milestones including deadlines for easement requests and Plan & Estimate (P&E) submission by the utility company.

The utility companies are responsible for researching historical records for recorded deeds in the utility companies name which are provided to the project team to prove prior rights. Upon receiving these documents, the design consultant and Utility Engineer will review and either

approve or deny the documentation provided. If approved, the utility company will receive a new easement in the name of the utility company. These easements are coordinated with the DTCI Land Acquisition team and drawn up on the plats to be acquired during the land acquisition stage of the project.

Once the P&E's are received from the utility company, DTCI's Utility Engineer will review the design to ensure all identified conflicts are accounted for. After review and approval of the P&E, the final cost estimate and utility relocation schedule can then be added to the overall project's schedule and cost estimate.

DTCI's Land Acquisition team and Utility Engineer work closely together during the Land Acquisition stage of a project. Until the appropriate land rights (i.e., proposed ROW/Utility Easements) have been acquired, the utility companies may not proceed with relocation. It is not until all land rights have been acquired that DTCI's Utility Engineer may issue the utility company their 'Notice to Proceed'(NTP). Upon issuing the NTP, the utility companies will schedule their contractor to begin utility relocation.

During the Utility Relocation phase of the project, it is important to provide inspection services and record keeping ensuring utility facilities are accurately relocated in their designated locations and at the proper depth. Providing inspection services during the relocation phase is an important piece to avoid incorrect relocated utilities which lead to prolonged delays and cost increases during the construction phase of the project.

Once the utility relocation is complete, the utility owner is required to submit the final invoice to DTCI. A comparison between the estimated utility costs before relocation and the actual final costs is submitted to DTCI by the utility owner. DTCI's Utility Engineer will review the invoice compared to the final cost estimate provided with the P&E. The results of the analysis must satisfy all requirements before recommending final payment. The reasons for differences should be included in the overrun or underrun letter from the utility owner.

The utility relocation step can take from six to fifteen months to complete based on the extent of utilities within the project corridor.

Construction Procurement: Road construction projects valued over $25,000 must be procured by competitive sealed bidding unless a written determination is made that sealed bidding is either not practical or advantageous. The County's typical method to procure construction services for road construction projects is design-bid-build (DBB). In a DBB delivery method, upon completion of the project design, all required permits are obtained, all easements and land acquisition is complete, and the majority of required utilities have been relocated, and the procurement of general construction services follows with a publicly advertised Invitation for Bid (IFB). The bid process begins when an IFB is publicly posted, advertised in a paper of record (Loudoun Now) for at least 10 days, and includes opportunities for prospective bidders to ask questions at a Pre-Bid Conference held by the County or by contacting the Contracting Officer in DFB during the bid period. Typically, most projects are out to bid for 45 – 50 days, depending on the size and

complexity. A public bid opening is held on the date and time the bids are due. Upon receipt of bids, a bid tabulation is recorded, and the apparent low bidder is identified.

Once the apparent low bid is identified, it is evaluated to determine if the bid is both responsive and responsible. A responsive bid is a bid that conforms in all material respects to the IFB and a responsible bid means that the bidder is determined to have the capability, in all respects to perform fully the contract requirements (including verifying references). Available project funding is confirmed including hard construction costs and soft construction costs which may be construction contingency, third party testing and inspections, utility relocation costs or fees and any construction-related costs that are the County's responsibility. Staff must also verify that the lowest responsive and responsible bidder is currently registered with the SCC in accordance with §2.2-4311.2. Full evaluation of the bids and budget may take approximately two to three weeks or longer if there are any bid irregularities (e.g., missing documents, verification of references, SCC determination, etc.).

Once a bid has been determined to be both responsive and responsible and available project funding has been confirmed, a Contract Award item is presented to the Finance/Government Operations and Economic Development Committee and then to the full Board for approval if the value is above staff award authority. Overall, the construction bid process takes approximately three to six months.

Prior to issuing an IFB for general construction services, DTCI works with DFB to procure construction engineering and inspection services (CEI) for road construction projects. CEI services typically include full time on-site owner quality assurance and control, construction administrative services, material testing, construction engineering and inspection services, and assistance with VDOT project inspections, administrative "close out," and VDOT audit and street acceptance. Similar to design contracts and as required by the VPPA, CEI contracts estimated in excess of $2.5 million are subject to the RFP process as described above under design procurement. CEI costs generally range between 10 to 15 percent of the total cost of construction. The RFP process for CEI services can take approximately six months to eight months to complete, depending on the size and complexity of the project.

DFB has also established "task order" contracts for CEI service on road construction projects that are smaller in size and cost. These task order contracts are procured issuing an RFP process consistent to the task order contracts procured under the design procurement process. Task order contracts are awarded to multiple engineering consultants and cannot exceed $2.5 million with an annual limit of $8 million on each contract. These task order CEI contracts significantly reduces the amount of time it takes to secure a contract for CEI services. The timeframe to award a contract under the task order contract can be accomplished in one to three months, depending on the complexity of the project.

Project Construction: The project implementation and construction phase start following the contract award. A Kickoff Meeting is held with the contractor following the contract award to review all pre-construction and contract requirements. The construction contract outlines all requirements for the delivery of the project including the construction duration, change

management process and project completion and closeout requirements.

When planning the construction duration of a project normal and customary weather conditions are examined on a seasonal and monthly basis. The construction contracts, managed in calendar days, include planned weather days within the contract time allocated. Throughout the progression of the work, changes may be required as unforeseen conditions are encountered or design errors and omissions are discovered requiring clarification or revisions. The contractor must present detailed cost and schedule justification for all changes and show that the change impacted the critical path of the project schedule to have additional contract time approved. The same is required if the contractor presents a change for additional weather days in a particular month; additional weather days may be approved but are typically with no additional cost to the County. Approved changes, including time, formally modify the contract completion date for the delivery of the project.

The general contractor is required to provide acceptable pre-construction submittals within 30 days of contract execution. These submittals include a base line construction schedule, schedule of values or unit prices and management plans for quality and safety, among others. In addition to processing pre-construction submittals, the contractor will be required to obtain a VDOT Land Use Permit or VDOT Tie-In Permit for the project, as required. Upon successful submission of the pre-construction submittals and issuance of an applicable VDOT permit, a Pre-Construction Conference is held and Notice to Proceed (NTP) is issued. The NTP starts the clock for the contractor's time as outlined in the contract.

Typical Construction Sequence: Once a project has been issued NTP, the contractor will begin a multi-phase sequence of construction. At times, these phases may give an appearance that the project is being delayed or that little work is being performed at the project site. The outline below provides a general description of the sequencing of construction for a road construction project and some of the challenges faced during each phase.

Site Preparation - Initial site preparation activities include mobilization, establishing survey controls and flagging the clearing limits, grading permit coordination with the erosion and sediment control inspector, and installation of erosion and sediment controls including construction entrances and temporary sediment basins prior to initiating land clearing and grubbing operations. On occasion, time of year clearing operations may be limited based on US Fish and Wildlife permitting for endangered species roosting restrictions. This phase of the project can take up to six months depending on the size and sequencing of the project.

Excavation and Earthwork Operations - Once clearing operations are completed, the contractor can begin cut to fill operations to obtain both vertical and horizonal alignment in accordance with the contract design documents. Challenges that occur during this phase include unsuitable material and rock that may be encountered during excavation. Although geotechnical testing and reporting will provide a general idea as to what material is at the subsurface level, the extent of this material can be difficult to determine given the limits of the geotechnical borings. Due to the physical properties of the rock in Loudoun County, often blasting is required which requires coordination and permitting through the Loudoun County Fire Marshal's Office.

Subsurface Utilities – In conjunction or upon completion of the earthwork operations, the contractor will begin installation of storm water pipe and structures as required by the contract design documents. On occasion, the contractor will be required to work with utility companies to relocate utilities within deep planned project cuts that cannot be relocated prior to construction. Some projects will include the relocation of Loudoun Water utilities impacting the project and requiring relocation from the ROW or existing easement. These relocations are typically completed by the contractor as part of the contract requirements. Coordination with utility companies can always prove to be a challenge and require scheduled inspections to verify and approve the work completed.

Road Subgrade and Curb and Gutter – Upon completion of the storm water piping and structures and any utility relocation, the contractor will begin preparation for the roadway subgrade. This includes ensuring compaction as required by the contract specifications prior to the placement and compaction of the road base stone. Some projects may require a cement treated base aggregate prior to placement of the road base stone. During this phase, the contractor will begin placing curb inlets on storm water structures and tying in curb and gutter as required by the contract documents. Challenges faced during this phase can be obtaining the required subgrade compaction prior to placement and compaction of the roadway base stone and maintaining appropriate grades on the curb and gutter to ensure proper flow of storm water to the curb inlet as designed. Weather is also a very big challenge at this stage.

Asphalt Placement – After the road base stone has been determined to meet compaction requirements, the contractor can begin placement of the base asphalt. Base asphalt is typically installed in multiple lifts of no more than 4-inch lift thicknesses before compaction. Once the base asphalt design thickness has been met, the contractor will place an intermediate layer of asphalt. Temporary striping can be placed on the intermediate asphalt layer to maintain traffic control, if necessary. Weather is the primary challenge when placing asphalt as moisture and temperatures play a significant role in meeting placement specifications.

Final Phase – As we approach completion of the work required in the contract, the contractor is typically placing the final surface asphalt layer, placing the permanent striping, placing topsoil and permanent seeding, converting temporary signals to permanent signals, when required, and installing permanent signage. Storm sewer piping and structures are being cleaned and camera, rills and ruts are being repaired, guardrail is being adjusted, if installed, and the temporary sediment basins are being converted to permanent storm water ponds with outfall structures. The primary challenge here is maintaining the contractor's attention to detail, the weather, and establishing enough grass to remove erosion and sediment controls.

Substantial Completion for roadway projects is typically achieved when the work has been completed, a punch list has been prepared by the County and VDOT and no significant elements of work are incomplete which would prevent the roadway from being open for public use. Liquidated Damages (LD's) for completion are associated with delays in Substantial Completion. Typically, all punch list items must be completed within 30 days following Substantial Completion to achieve Final Completion. Depending on the project's scope and complexity, most roadway projects take between one and three years to construct with larger projects having longer durations.

Project Closeout and Acceptance by VDOT -- The project close-out phase entails final inspections, punch-list resolution, resolution of legal and financial matters, negotiations for construction claims arising from the work and schedule, and turnover of the facility to VDOT for operation and maintenance. The process for street acceptance following completion of construction requires compliance with the County's Facility Standards Manual (FSM) and VDOT criteria. VDOT acceptance can be achieved in two ways. New construction of roadways or road construction projects adding lane mileage are required to process a street acceptance package through Loudoun County DBD and then VDOT for acceptance into the secondary road system. This process can take several months (six to twelve months) following completion of construction and the opening of the road. Road projects constructed within existing VDOT right-of-way under a VDOT LUP will work directly with the VDOT Permit Inspector to close out the VDOT LUP and accept the project into VDOT's secondary road system. This process can take several months (three to six months) following completion of construction and the opening of the road.

The construction step can take from 12 to 36 months to complete depending on the size and complexity of the project.

ISSUES: Given the rapid growth occurring in the county, project development is a dynamic process that often goes through adjustments as land uses, traffic patterns, and utility infrastructure change during the development process. As changes occur or more information becomes available, project scopes, estimated costs, and schedules require periodic updates as the project progresses through development. In addition, public opinion and expectations can vary through the development process requiring different levels of communication and outreach. Regulatory requirements also undergo change as alteration in transportation system uses create new or differing safety concerns. Based on variability during the development process that is often outside the control of the development teams, several issues are listed below that can affect projects during development.

Differences between Study and Design – Over the last few years, DTCI has conducted multiple planning studies to help identify the specific transportation and safety needs along particular corridors, within specific neighborhoods and streets, or at individual intersections. These studies often include public presentation and encourage public feedback. Examples of corridors, neighborhoods, and intersections studied by DTCI or currently being studied are Route 9, Route 15, Evergreen Mills Road, Arcola Mills Drive, Waterford, Dulles Farms, Waxpool Road intersections, and Route 7 intersections.

Upon completion, the planning study recommendations and reports often include graphic renderings of proposed improvements. Although these renderings are based on basic engineering principles, they are only concept plans and not engineered designs. They are very helpful in refining a project's scope, but still require engineering design before a concept can be advanced to construction. The engineering design process takes the concepts and translates them into specific drawings and specifications that a contractor utilizes to construct the improvements. Although a concept drawing can show the proposed alignment of a transportation project, it does not include the vertical profile of the improvements, the location and type of drainage structures, structural

details for traffic signals, retaining walls, culverts, or bridges, and many other details. The process to conduct the engineering design is complex, requires multiple steps, and must integrate elements such as right-of-way acquisition, and utility relocation. DTCI has encountered confusion among the public who think the planning study concept plans are engineered plans and assume a project is ready for construction after completion of a study. Except for the simplest projects, multiple years are required to go from planning study completion to design completion.

Design Stage and Impact on Estimated Cost and Schedule – As mentioned earlier in the item, engineering design tends to follow an iterative approach where more detailed design elements build upon more basic design elements. Therefore, there are more unknowns earlier in the design process than there are later in the process. More unknowns result in more uncertainty in the areas of estimated costs and task durations. Although there is always a level of uncertainty associated with project cost estimates and schedules, these uncertainties are greater at project inception than at the completion of the engineering design phase.

When a project completes the planning and budgeting phase, it has an estimated cost and duration based on the best available information at the time. In general, the estimated cost and duration are based on a concept plan or 10% to 15% design in the best-case scenario. Since many of the design details are not fully defined, estimated costs and durations include contingencies to account for unknowns. As the project progresses and design elements become defined, the level of contingency required to account for unknown can be reduced. At project inception (less than 10% design), VDOT suggests design contingency between 10% and 15%, ROW acquisition and utility relocation contingencies between 30% and 75%, and construction contingency between 25% and 75%. At 100% design, these contingency ranges go down to 0% to 5% for design, 10% to 20% for ROW acquisition and utility relocation, and 10% to 15% for construction.

When projects enter the CIP, their estimated costs and schedules are based on non-engineered concept plans. DTCI works with DFB to include cost and schedule contingencies that are added to the concept level cost and schedule estimates. As a project goes through the design process, its budget and schedule may get updated in subsequent CIPs as the project parameters become more defined. Although the percent of contingency may go down as a project becomes more defined, the estimated cost or duration may increase as more details are understood about the project. Market conditions also affect estimated project costs and durations in addition to the level of unknown. Over the last few years, the high level of construction activity in the Washington, D.C. metropolitan area has resulted in wide fluctuations in construction costs. As a result, project budgets and schedules are analyzed continually and may change year to year in the CIP based on more detailed estimates and changes in market conditions.

Designing in an Environment of Changing Conditions – At the same time DTCI is developing transportation projects, private development is occurring within the county at a rapid pace, often in the same areas. In particular, data center development is occurring adjacent to corridors with ongoing transportation projects. This situation adds an additional level of difficulty to engineering design as the County's design consultants must design to future conditions that differ from actual

conditions surveyed in the field. Extensive coordination is required between the County's design teams and designers of private developments to locate infrastructure that share the same space.

Extensive private development within the county requires the construction of additional utility infrastructure to serve the development. It is not uncommon for utility construction to be ongoing within the same ROW that DTCI is designing transportation improvements. Although utilities are supposed to obtain VDOT permits to install utilities with the ROW, the utility work is often done with little advance notice, is not installed according to plan, and is sometimes done without the required permits. Since this work occurs after initial survey of utilities by the DTCI project team, supplemental survey and utility designation work is often required during engineering design.

When designs require alteration due to coordination with adjacent development or changed to address new utilities, it increases design, utility relocation, and construction costs, in addition to pushing schedules back. Simultaneously, land values rise as more intensive land uses are developed. These factor place pressure on project budgets. This is another reason project budgets and schedule need to be re-evaluated continually and sometimes require updates in the CIP.

Changes in Intersection Design Philosophy – Until recently, the installation of a traffic signal was viewed as the default approach to deal with unsignalized intersections with extensive traffic delays or safety issues. Although traffic signals are still used extensively with Virginia, VDOT is using a more comprehensive approach to deal with intersection capacity and safety issues. Before a traffic signal can be proposed at an intersection, alternative intersection configurations need to be reviewed and justification provided for the installation of a traffic signal. In many cases, alternative designs not involving traffic signals are preferred such as roundabouts or restricted turning movements. Depending on the selected alternative, the cost of the intersection improvement may be more than a traditional traffic signal and may take more time to develop.

Right-of-Way Acquisition: Even when property owners are responsive, there are various circumstances that delay the ROW acquisition process. Properties owned by organization such as churches or homeowner associations often require approval by a board representing the organization. Since these boards only meet periodically, action on an offer is limited to the frequency the organization's board meets. If negotiations over the sale terms involve counter offers, several board meetings may be required to complete the transaction causing the process to last numerous months.

It is not uncommon for legal counsel representing a property owner to request revisions to the County Attorney's Office's draft deed that are not acceptable to the County. In these cases, negotiations over deed language can also last many months until verbiage acceptable to the County is adopted.

Delays are also experienced when third-party interests such as mortgage companies and trustees withhold their approval of a deed even when a property owner is agreeable to granting the County ROW. When dealing with mortgage companies, part of the difficulty is contacting the appropriate representative capable of processing the deed. Delays lasting many months are not uncommon

when dealing with unresponsive mortgage companies or trustees. Staff from DTCI and the County Attorney's Office are exploring ways to improve the efficiency of the right-of-way acquisition process, including, for example, the use of written contracts with property owners to address some of the issues and delay factors that staff has frequently encountered in the past.

Right-of-Way Acquisition Process Improvements:

- Plat Process – Currently the County's land acquisition plats are submitted to Building and Development for review and are designed to the standards in the Land Subdivision Ordinance (LSDO) and Facilities Standards Manual (FSM). Delivery of County transportation projects fall under different State Code sections and are not subject to all the same criteria outlined in the LSDO and FSM. DTCI staff has consulted with neighboring jurisdictions and found that their transportation staff review and approve plats in house as opposed to sending it through a Building and Development type of referral process. DTCI staff is investigating steps to implement a similar program.

- Standardized Letters and Agreements – The land acquisition team has worked closely with the County Attorney's Office to develop standardized form letters and agreements that can be used for routine acquisitions. Standardized documents will expedite the offer letter review and approval process and insure consistency and professional offer packages.

- Expanded use of Real Property Acquisition Consultants – Acquisition consultants will be used for projects with numerous properties or highly complex acquisitions that involve complicated relocations. Use of consultants will free up staff to multitask and work on numerous projects simultaneously.

- Condemnation Authorization Requests – A possible strategy could be investigating an option to expedite the condemnation process. When VDOT has reached an impasse, they may proceed directly to filing a Certificate of Take. Local jurisdictions must hold a public hearing prior to proceeding. There are some communities that have the condemnation public hearing up front for all the project's impacted properties so that once staff has determined an impasse has been reached, the County Attorney can immediately proceed with condemnation. This may not be a politically favored strategy, but it is a possibility staff could investigate to reduce timeframes.

Utility Relocation: During the utility relocation process, DTCI encounters numerous issues that challenge the process. A few of the issues commonly encountered by DTCI are listed below:

- Utility companies do not always meet the deadline to provide their plan and estimate (P&E) to DTCI. This delay in providing the P&E makes it difficult to estimate the total cost of utility relocation and makes it difficult to provide the project team with a realistic duration for utility relocation until later in the project development process. DTCI conducts

regularly scheduled meetings with Dominion Energy and Loudoun Water to help track the utility relocation process with these utilities and regularly meetings are being scheduled with Washington Gas.

- Once DTCI provides the utility company with a 'Notice to Proceed', often it can take several weeks and sometimes months for a utility company to begin utility relocation. This is caused by utility company's resources being stretched thin to meet not just the County's needs but other needs as well including VDOT, other localities (Fairfax, Prince William, Arlington counties) and private development projects.

- During the utility relocation phase of a project, utility companies do not always relocate their facilities according to the approved relocation plan. When utility facilities are not relocated according to the plan it can cause major conflicts during the construction phase of the project. This ultimately leads to lengthy construction delays and cost increases.

- Sometimes utility conflicts arise during the construction phase of the project that are not caused by poor relocation methods but rather not knowing the utility was there in the first place. Typically, this occurs when VDOT permits a utility to install infrastructure within the limits of County projects without reaching out to DTCI to confirm whether or not the install would cause conflict with the County's projects. This again can cause construction delays and cost increases.

- When VDOT Permits are obtained to install fiber lines and their associated conduits, the permits are taken out in the name of the installer. Once installed, it is not uncommon for multiple fiber carriers to lease space in the same conduit or bundled conduits. If a transportation project necessitates the relocation of the conduits and fiber lines, it is sometimes difficult to identify the carriers utilizing the fiber lines since there is no registry of carriers utilizing the fiber lines within the ROW. It sometimes takes lengthy research to identify all the potential carriers that need to be contacted to relocate their facilities.

- Upon completion of utility relocations, the utility companies submit final invoices which sometimes come in over the estimate provided by the utility company. Final invoices can come in over double the initial cost estimate due to poor estimating, resulting in additional funds needed to cover the overrun.

- DTCI Utility staff cannot meet the current and future demand to provide effective utility coordination. As the number and complexity of CIP projects increase, DTCI's utility staff is not and will not be able to keep the County's projects on schedule and within budget.

To accelerate the utility relocation process, DTCI has recently performed tree clearing work on several projects where overhead utility poles required relocation. DTCI has found this step reduces the time necessary to relocate utility poles compared to schedules prepared by the utilities where they perform the tree clearing. This step was recently performed along Belmont Ridge Road

between Truro Parish Drive and Croson Lane reducing the utility relocation duration by several months.

Construction Claims and Disputes: Differences that develop during the life of the construction contract result in protests or claims by the contractor to the owner (County). The assigned County construction manager maintains numerous documents and records of the project conditions to protect the County against claims for additional time and money. Often these claims are the result of:

1. Differing site conditions (sometimes called unforeseen conditions),
2. Unusually severe weather conditions,
3. Productivity losses,
4. Failure to agree on change order pricing, and
5. Conflicts in the plans and specifications.

When subsurface or hidden elements of the work that were not easily discernable at the time of bidding the contract are involved in a project, the risk for a claim for differing site conditions can occur. This type of claim generally results in a delay in the project, and increased project costs.

Severe rains or similar weather that prevents work from being done, or which in any way delays the project, may not always be considered an excusable delay. Loudoun County includes provisions in its construction contracts to account for normal and customary weather events. However, when the contractor can demonstrate that the weather conditions have exceeded or occurred more frequently than what is considered normal and customary or that the site conditions are not conducible for construction activity due to a weather event, the Contractor may be entitled to additional contract days to complete the project. These delays are measured in days, weeks and months.

One of the most common causes of contractor claims occurs during attempts to find agreement on the pricing for project change orders. This is predominantly due to the fact that this pricing is not subject to the competitive process. In these cases, the County contracts include provisions to direct the work to commence, to avoid creating delays in the work, only to resolve the pricing later, which typically occurs in the form of a claim filed by the Contractor. This process is referred to as a "unilateral change order."

VDOT Street Acceptance: VDOT street acceptance of a road construction project can extend well beyond the County's substantial and final completion of the project. Delays in street acceptance can result from items including the improper alignment of a handicap ramp at an intersection or pedestrian push buttons, immature ground cover or stormwater features, the need for additional signage, previously unidentified easement issues, waiting on VDOT to schedule inspections or the time it takes to process paperwork through VDOT's Central Office. As a result, the County assumes maintenance responsibility until final acceptance or closure of the VDOT LUP has been achieved. This maintenance period can prove to be costly considering it is typically not included in the initial award amount.

Design-Build as an alternative project delivery method: No one delivery method is best for all projects. The design-build (DB) delivery method is an attractive option for the delivery of certain project types for many owners with possibilities to minimize costs and delivery schedules in some cases. Often using the DB process can accelerate a project delivery. However, this only holds true if the project is a good candidate for the DB option. DB is more favorable when:

- The project scope is clear, and the County does not need a significant role in the decision making process for issues such as alignment and intersection configurations.
- The project site is available for the DB team's primary use and avoids conflicts with other parties during construction.
- Projects where significant coordination is necessary between design, ROW acquisition, and utility relocation.

A key issue to consider with DB projects is the necessity of aligning a project's funding and appropriation schedule with the delivery method. Typically, County projects are planned as design-bid-build deliveries with an appropriation schedule in the CIP that staggers design, ROW and construction funding over a period of several years. A DB project would require full funding appropriations at the onset of the project to award the contract for the combined services.

In a DB delivery method, a two-step procurement process is initiated for the procurement of design professional services and construction services in one solicitation following the competitive negotiation process in the VPPA. Typically, the project requirements must be identified and preliminary engineering is completed. The first step of the procurement process is evaluation of the offerors' qualifications as related to the project requirements and the second step is the evaluation of the price and schedule proposals for offers that the County has previously determined to be qualified. Depending on the size and complexity of the project, this process can take up to nine months.

In a DB delivery method, a scope validation period of 120 days follows the Kickoff and NTP. The purpose of this period is for the DB team to review all contract documents and prepare preliminary project information such as complete site surveys, geotechnical borings and utility investigations to identify any scope of conditions that may differ from that identified in the contract documents since the documents typically only contain very preliminary or conceptual design information. At the conclusion of the scope validation period, the final scope of the project is agreed upon between the DB team and the County and the project can commence the design phase of the project.

Federal Funding and Procurement: It is critical to be aware of approved or potential federal funds on a given project at the beginning of a project's development to the extent possible. In addition to differing project administration and reporting requirements, the use of federal funds typically necessitates additional terms and conditions of design and construction contracts including limitation of overhead and mark-up on sub-consultants and direct costs, requirements for Disadvantaged Business Enterprise (DBE) and documentation of DBE goals and efforts, Davis-Bacon wage rate requirements in construction and Buy America requirements. These terms and conditions must be addressed in the design consultant and construction procurement process at the

onset and the contracts often necessitate advance review by the sponsoring entity (VDOT, FHWA, etc.). Where project funding agreements require compliance with federal requirements, the funding to the County may be compromised should there be a failure to meet and document all requirements. Additionally, there may be administrative costs from the sponsoring entity for their reviews and monitoring of the project that need accounting in the overall project budget and the time required for the reviews should be planned for in the overall project schedule.

Staff is actively working on strategies to mitigate the issues listed above.

FISCAL IMPACT: There is no fiscal impact associated with this item.